Virtual vs. Human Influencers: The Role of Parasocial Interaction, Source Credibility, and Machine Heuristics in Shaping Consumer Responses

A

SYNOPSIS

(THESIS PROPOSAL)

SUBMITTED TO

The ICFAI University, Dehradun

IN PARTIAL FULFILLMENT OF THE REQUIREMENT

FOR THE AWARD OF THE DEGREE OF

DOCTOR OF PHILOSOPHY (PhD.)

IN

MANAGEMENT

BY

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2026

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Paper Title	Virtual vs. Human Influencers: The Role of Parasocial Interaction, Source Credibility, and Machine Heuristics in Shaping Consumer Responses
Similarity	5%
Paper ID	5532153
Total Pages	68
Submission Date	2026-04-23 16:27:16

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ABSTRACT

Influencer marketing has emerged as a dominant strategy in digital marketing over the past decade. The review of contemporary literature positions it as a major enabler in shaping consumer attitudes and purchase decisions. The field of influencer marketing was traditionally driven by human influencers. However, with the advancements in generative AI technologies, a new entity of virtual influencers is on the rise. Both human and virtual influencers today coexist with their own advantages and challenges. Human influencers primarily drive engagement from perceived authenticity, emotional relatability and parasocial bonds. On the other hand, virtual influencers play on the aspects of total brand control, high scalability and lower reputational risks.

Virtual influencers are primarily digitally created avatars which mimic human appearance and behaviour. The rising popularity of virtual influencers has, therefore, led to a rise in scholarly interest in understanding their actual effectiveness when compared to human influencers.
Contemporary research has highlighted contrasting views on the effectiveness of human and virtual influencers. Some studies report higher effectiveness of human influencers, while others find that virtual influencers may posit equal or stronger persuasion effects under varied conditions.

The superiority of human influencers is attributed to their capacity to build more substantial emotional bonds, thus making them appear more credible. On the contrary, virtual influencers have aspects like novelty, aesthetics and objectivity which make them unique, giving them a substantial edge. These discrepancies in the literature further suggest that additional research needs to be conducted to gain a better understanding of an influencer's effectiveness. Furthermore, it has also become important to identify the various underlying factors which explain how and under what conditions influencer type affects consumer responses.

This study aims to examine the effect of influencer type (Human vs Virtual) on two key outcome variables, i.e. Consumer engagement and purchase intention. The research also examines the role of source credibility and parasocial interactions as mediators in this relationship. Source credibility comprises three dimensions, namely expertise, trustworthiness and attractiveness. Parasocial interaction refers to the one-sided emotional bonds that a consumer builds with an influencer or media personality through regular interactions. These two mechanisms have received considerable

attention in the human influencer context; their role in determining the effectiveness of virtual influencers remains to be explored in greater depth.

Another important variable for this study is the role of machine heuristics in moderating the relationship between credibility, parasocial interaction and consumer outcomes. As defined in literature, machine heuristics is a cognitive bias. It is an individualistic belief that machines are more objective, fair and trustworthy in their responses. This belief can therefore have a considerable effect on determining how consumers react to the content of virtual influencers. This would further impact their interactions and behavioural responses to the marketing efforts of such influencers. This may therefore have an impact on the perceived credibility as well as the parasocial bonds the consumers build with virtual influencers. Thus, by combining these factors, the study aims to build a comprehensive framework of moderated mediation which could explain the effect of influencer type on consumer responses and the underlying mechanisms.

The study employs an experimental design comprising two studies. The first study analyses the direct and mediated effects of influencer type on consumer responses through credibility and parasocial interaction. The second study examines the moderating role of machine heuristics in further strengthening this relationship or vice versa. Collectively, the two studies aim to provide reliable empirical evidence of the underlying factors that make one influencer more effective than the other.

The study seeks to contribute to the existing literature by advancing the understanding of advancements in influencer marketing concepts. It aims to expand the existing theoretical structure to new and novel developments in the VI domain. The study also introduces novel concepts like machine heuristics to the influencer marketing context as a significant cognitive bias that affects overall outcomes. From a practical perspective, the findings of this work shall provide marketers and brands with valuable insights that can be used to craft effective marketing strategies. It will enable the decision of determining when Vis can be a viable alternative to human influencers.

Keywords: Virtual influencer, Human influencer, Influencer marketing, social media influencer, Consumer responses,

1. Introduction

1.1 Background and Context

The global marketing landscape has undergone a profound structural transformation over the past decade. The shift from print and radio advertising to digital platforms has evolved into a new form of brand communication that places greater emphasis on individual users. ***Social media influencers*** *are defined broadly as individuals who leverage their social media presence and perceived authenticity to shape the opinions, attitudes and behaviours of their followers (Lou &Yuan, 2019; Freberg et al., 2011*). These have become dominant forces in digital marketing. Unlike traditional advertising, influencer marketing works through various psychological aspects. This is primarily because consumers view influencers as trusted partners instead of brand agents. This further makes them less resistant to persuasion and increases the credibility of brand messages. (Horton & Wohl, 1956; Jin et al., 2019).

Against this backdrop, a new technological advancement has begun to reshape the way influencer marketing works. With the emergence of ***Virtual Influencers (VIs)***, there is an observable shift in marketing strategies. *VI is a digitally created persona developed using computer-generated imagery (CGI) and artificial intelligence (AI) that is designed to replicate the appearance, personality and communicative patterns of human influencers on social media platforms (Thomas & Fowler, 2021; Lou et al., 2023).* Unlike HIs, VI is completely controlled by brand terms or creative agencies, which means there is a reduced risk of reputational damage. They can, therefore, be scaled across languages and markets while keeping brand identities that are perfectly curated and consistent. *(Barari et al., 2025; Jayasingh et al., 2025).* VIs like the CGI character Lil Miquela, with over 3M Instagram followers, along with India's Kyra and South Korea's Rozy, are compelling proofs of how these digital personalities can capture widespread attention and also become a commercial success on par with their human alternatives. *(Jin et al., 2021; Ferraro et al., 2024).*

From a strategic point of view, VIs offer brands several advantages, such as total control over narrative, no reputational risk, no salary negotiations and also no geographic limitation *(Willemsen et al., 2025).* With the rapid development of generative AI and deep learning, these personas continue to become more flawless. Thus, it is becoming increasingly challenging for consumers to

distinguish between human and AI-generated content. This further raises concerns over issues of authenticity, disclosure and consumer trust *(Willemsen et al.,2025; Djafarova & Davies, 2025).* From the consumer behaviour aspect, the question remains whether VIs can generate similar or better consumer responses, such as engagement and purchase intention, when compared to humans *(Igarashi et al., 2024; Zeng & Lin, 2025).*

The scholarly interest in this phenomenon has grown at an extraordinary pace. A bibliometric analysis of the virtual influencer domain based on Scopus and Web of Science data conducted by us found 382 unique publications across 2020-25, revealing an annual scientific growth rate of 109.82%. *(Refer to Appendix A (Fig A1: Annual Scientific production, 2020-25))* This is an exceptional growth rate and signals that virtual influencer research is not just a niche curiosity but is rapidly transforming into a field of scholarly inquiry *(Nobre & Ferreira, 2023)*. The bibliometric data further revealed that a total of 869 authors contributed to 213 distinct publications, receiving an average citation rate of 19.08 in a short span of time. This indicates meaningful scholarly engagement within the field. The international co-authorship rate of 22.5% further reflects the emergence of collaborative, cross-cultural research networks, particularly among scholars in the United States, China, South Korea, and the United Kingdom *(Donthu et al., 2021).*

*Note: All bibliometric visualisations referenced in this section — including annual publication trends, author collaboration networks, keyword co-occurrence maps, and thematic cluster maps — are presented in **Appendix A** of this proposal. Figures are labelled sequentially and correspond to the order in which they are cited in the text.*

1.2 The Virtual Influencer Phenomenon: Definitions and Scope

Before discussing the research problem, it is important to establish conceptual clarity on the key variable of our study, Virtual Influencers (VI). The term Virtual Influencer encompasses a range of computer-generated personas that operate on social media platforms in ways designed to mimic the behaviour and aesthetic of HIs. *Thomas and Fowler (2021)* define VIs as *"AI-generated digital entities that simulate human-like personalities and engage audiences through social media content,"* while *Lou et al. (2023)* describe them as *"computer-generated social media influencers that are constructed to look and behave like humans but are entirely artificial in origin."*

Mouritzen et al. (2023) further distinguish VIs from related digital characters by identifying four unique defining attributes, namely customisation, flexibility, ownership, and automation. They suggested that these are the characteristics that fundamentally separate them from HIs in terms of how they are managed and deployed.

VIs can further be classified along two dimensions depending upon their degree of anthropomorphism (how human-like they appear) and their position on the reality-virtual continuum (how closely they are designed to resemble a real-world persona) *(Barari et al., 2025; Igarashi et al., 2024). Moritzen et al. (2023)* proposed a 2x2 taxonomy that helps explain the wide variation observed across VIs in practice, from hyper-realistic CGI personas (such as Lil Miquela and Rozy) to cartoon-like or anime-style virtual characters. These are not merely aesthetic differences, but they carry meaningful implications for consumer trust, parasocial relationship formation, and purchase behaviour, as demonstrated across several recent empirical studies *(Arsenyan & Mirowska, 2021; Saumer et al., 2025; Djafarova & Davies, 2025).*

The emergence of VIs is both a novel and interesting phenomenon, both practically and theoretically, in the existing body of influencer marketing research. The majority of influencer marketing scholarship, including source credibility (Ohanian, 1990; Lou & Yuan, 2019), parasocial interaction (Horton & Wohl, 1956; Sokolova & Kefi, 2020), authenticity (Audrezet et al., 2020; Kim & Kim, 2021), and consumer engagement (Hollebeek et al., 2014; Brodie et al., 2011), has been developed exclusively in the context of HIs. Few studies have examined the extent to which humans or VIs may be more persuasive under specific circumstances. While most studies show that HIs still outperform VIs, some have reported contradictory findings (*Ameen et al., 2024; Igarashi et al., 2024; Zeng & Lin, 2025; Djafarova & Davies, 2025; Willemsen et al., 2025)*. Therefore, there is a need for further research to examine consumer perception of VIs in comparison to HIs. Also, it is worth studying under what circumstances VIs may outperform HIs. Moreover, it is pivotal to examine what underlying mechanisms are responsible for shaping such consumer responses *(Jha et al., 2025; Liu & Wang, 2025; Omeish & Ashour, 2025)*. This would help marketers understand the real business risks and the expected return on investment in using virtual influencers for marketing.

With the growing popularity of VIs, they are also collaborating with global brands such as Prada, Samsung, Dior, and Balmain, personas for major campaigns. Nevertheless, the academic literature

needs to build a comprehensive understanding of determinants and mechanism which decide the effectiveness of a VI.

1. Research Problem

The central research problem of this study is to understand how different types of influencers (HI vs VI) influence consumer behaviour. With the rise in virtual influencers, it has become important to understand and examine the underlying psychological process behind the effectiveness of various influencers. The inconsistency of past literature in this context poses a significant gap in defining the determinants of influencer effectiveness *(Kuo & Le, 2025)*. It has been further noted that some studies suggest higher effectiveness or HIs as they evoke greater emotional responses *(Jayasingh et al., 2025)*. On the contrary, contemporary literature also notes that attributes like novelty, visual appeal, and controllability help VIs gain an advantage over HIs *(Saumer et al., 2025)*. Thus, the contrasting nature of literary findings suggests that the determinants of influencer effectiveness are more complex than they appear. Thus, there is a need for further research to identify potential factors contributing to these varied results.

Therefore, to address this major gap, the current study plans to incorporate two key variables: source credibility and parasocial interaction to possibly explain the variance in effectiveness. Prior research supports the impact of credibility factors such as trustworthiness, expertise and human resemblance *(Saumer et al., 2025)* on behavioural outcomes of consumers. Empirical evidence also suggests the role of parasocial relationships in enhancing the persuasiveness and engagement of influencers *(Lee et al., 2025)*. However, it remains unexplored how these two factors work synergistically. There is also a need to further understand how cognitive biases and individualistic beliefs strengthen or weaken the influencer's impact in producing consumer responses *(Lee et al., 2025)*. Therefore, through this study, we aim to provide a clearer and more comprehensive understanding of the effect of influencer type on consumer behaviour in the context of AI-driven marketing.

2. Literature Review

With the growth of technology and the popularity of digital media platforms, influencer marketing has emerged as a popular research area in the marketing domain. It is often described as an evolved form of celebrity endorsements in which regular social media users take the role of influencing

consumer opinions and purchase decisions. These social media personalities, commonly referred to as social media influencers (SMI), use relatable content and personal narratives to persuade their followers to have a behavioural impact (Freberg et al., 2011; Schouten et al., 2020). Influencer marketing is defined as "leveraging individuals with influence and authority on social media to promote brands and products to a target audience" (Lou & Yuan, 2019). Studies often suggest that the fame and approachability of an influencer, helps audiences perceive them as their companions rather than commercial agents. This gives them higher perceived authenticity which further leads to better campaign performances among their followers (Horton & Wohl, 1956; Jin et al., 2019). With the growing interest of scholars in this field research is now moving ahead of superficial factors such as follower counts and reach. The areas relating to underlying psychological process that helps define the mechanisms of how an influencer content impacts consumer behavior is now gaining prominence.

Over the past decade, the growth of influencer marketing literature has led to the development of a broad range of variables which have been studied extensively. These variables have often been used to understand the drivers of consumer responses to influencer content. Among the most widely used variables are influencer characteristics like attractiveness, expertise and trustworthiness. These variables collectively form the dimensions of source credibility, which is mostly associated with positive consumer behaviour outcomes (Ohanian, 1990; Jin et al., 2019). Apart from credibility, there are also content-related constructs which have been popular. Contemporary literature often discusses the quality, authenticity, and informativeness of the influencers as significant drivers of consumer attitudes and further purchase decisions (Cao et al., 2025; Lou & Yuan, 2019). Another growing area of interest is to study influencer-product congruence. It has been noted by scholars that this relationship also plays an important role. The higher the congruence, the stronger the positive impact of campaigns, leading to stronger consumer attitudes and buying intentions (Belanche et al., 2021).

Subsequently, research also notes that influencer content and its informational value or the quality of posts are also significant drivers of consumer behaviour (Barari et al., 2025). Scholars have also noted a significant impact of self-disclosure on consumer engagement and purchase intention (Audrezet et al., 2025). It has been noted by scholars that when influencers share experiences from personal lives or their opinions, the audience feels a greater connection and finds the creator more relatable (Porter et al., 2019; Sung & Kim, 2010). Apart from these content factors, research

suggests that follower and their characteristics also have a crucial impact on engagement. Social identity has also been found to have strong effects on consumer attitudes and engagement. Furthermore, the characteristics of the posts, which include the informational and hedonic value, also have a significant impact on purchase intention (Audrezet et al., 2025).

Literature also suggests that sponsorship disclosure, i.e. a clear label of paid collaboration, also impacts engagement and behaviour intentions of the consumer. However, the effects of sponsorship disclosure on consumer trust and persuasion have been varied depending upon the timing and type of disclosure (Boerman, 2019; Belanche et al., 2021). Despite the breadth of coverage, it has been noted that the current literature still focuses on a relatively narrow range of theories, contexts and methodological approaches (Ham & Eastin, 2025). Nevertheless, it becomes important to acknowledge that there is limited consensus on the importance level of these variables and their underlying conditions.

Key empirical studies on virtual influencers.

Study	Influencer type	Method	IVs/Moderators	DVs/Mediators
Thomas and Fowler (2021)	Virtual vs. human influencer	Experiment	Endorser type/Transgression	Attitudes toward the brand, purchase intentions/ Perceptions of responsibility
Sands et al. (2022)	Virtual vs. human influencer	Experiment	Influencer aspects/Need for uniqueness	Consumer outcomes/Social psychological distance
Franke et al. (2023)	Virtual vs. human influencer	Experiment	Endorser type/Labeling, product category	Brand innovativeness, purchase intention/ Perceived novelty, expertise
Belanche et al. (2024)	Virtual vs. human influencer	Experiment	Influencer type/Product type	Intention to follow the advice/Consumer-influencer identification, usefulness
Zhou et al. (2024)	Virtual vs. human influencer	Experiment	Influencer type/Post modality (video vs. image)	Brand interest, purchase intention/Emotional engagement, parasocial relationships
Fowler and Thomas (2025)	Virtual vs. human influencer	Experiment	Sexualization/Influencer type	Brand perceptions/Post offensiveness, ethical judgments
Mo and Wang (2025)	Virtual vs. human influencer	Experiment	Influencer type/Consumers' construal level	Consumer responses (purchase intent, brand attachment, credibility)/Incremental mindset
Wang, B. et al. (2025)	Virtual vs. human influencer	Experiment	Influencer type/Language arousal (high vs. low)	Purchase intentions/Language typicality, trust
Wang, J. et al. (2025)	Virtual vs. human influencer	Experiment	Influencer type/Language type (rational vs. emotional)	Endorsement effectiveness/Perceived altruistic motivation, perceived congruence
Willemsen et al. (2025)	Virtual vs. human influencer	Experiment	Influencer type	Understanding persuasive intent, skepticism/ Intentions attributed, emotions attributed
Ahn et al. (2022)	Virtual influencer	Survey	Anthropomorphism	Post attitude, brand attitude/Social presence, attractiveness
el Hedhli et al. (2023)	Virtual influencer	Survey	Anthropomorphism	Purchase intention, willingness to follow/ Warmth, competence
Kim and Park (2023)	Virtual influencer	Survey	Attractiveness/Product-endorser fit	Purchase intention/Mimetic desire, brand attachment
Lim and Lee (2023)	Virtual influencer	Experiment	Identity origin (disclosed vs. not disclosed)/Emotion	Influencer credibility, parasocial interaction
Dabiran et al. (2024)	Virtual influencer	Survey	Anthropomorphism	Purchase intention to/Perceived credibility, parasocial relationship
Gutuleac et al. (2024)	Virtual influencer	Experiment	Anthropomorphism	Uncanniness/Purchase intention

Ham et al. (2024)	Virtual influencer	Text analysis; experiment	Emotion	Audience attitude
Muniz et al. (2024)	Virtual influencer	Experiment	Disclosure	Brand trust
Yan et al. (2024)	Virtual influencer	Experiment	Type (mimic-human vs. animated-human vs. non-human)	Emotional attachment, benefit seeking/Social presence
Barari et al. (2025)	Virtual influencer	Text analysis; experiment	Anthropomorphism (high vs. low)/Virtual influencer size (micro vs. macro), virtual influencer agency (independent vs. brand owned)	Consumer engagement, consumer well-being/ Upward social comparison
Cheng and Toung (2025)	Virtual influencer	Experiment	Anthropomorphism/Political identity, background music (mood states)	Donation/Identification
Kim, E. et al. (2025)	Virtual influencer	Experiment	Virtual influencer type (human-like vs. anime-like)/Sponsorship disclosure	Purchase intent/Influencer trustworthiness, perceived novelty
Liu and Wang (2025)	Virtual influencer	Survey	Anthropomorphism (humanness, attractiveness, eeriness)/ Autonomy	Parasocial relationships strength/ Trustworthiness, wishful identification
Ozdemir et al. (2025)	Virtual influencer	Experiment	Form realism (high vs. low)/Product domain (non-physical vs. physical)	Brand outcomes/Perceived proximal sensory capabilities
Xia et al. (2025)	Virtual influencer	Experiment	Beauty level (high vs. normal)/Product functional type (parasomatic vs. intrinsic aesthetic)	Psychological distance, purchase intention/ Perceive appearance threat, appearance response efficacy
This study	Virtual influencer	Survey	Congruence in anthropomorphic appearance and behavior	Purchase intention/Psychological distance

Figure 1: Key empirical studies on VIs (Cao et al., 2025).

The review of existing literature shows that most of the research focuses on studying the persuasion effects of influencers. The two most common constructs under study have been source credibility and parasocial interaction. Literature defines source credibility as "the degree to which a consumer perceives an influencer as expert, trustworthy, and attractive" (Ohanian, 1990). The theory of source credibility was first introduced by Hovland and Weiss (1951). This theory has ever since been central to the marketing literature. This theory has also been extensively studied in the context of influencer marketing, specifically in the context of human influencers. Scholars have consistently related source credibility to building consumer trust, engagement, and positively affecting purchase intention (Jin et al., 2019; Jha et al., 2025).

Moving ahead, parasocial interaction (PSI), as a concept, was introduced by Horton and Wohl (1956). PSI refers to "the one-sided sense of relationship that media audiences develop with media figures" (Horton and Wohl, 1956). Influencer marketing literature suggests that PSI has a positive impact on consumer engagement. Research suggests that PSI explain the level of closeness and emotional connection the audience builds with influencers, which decreases their resistance to persuasion and makes the audience more receptive to the recommendations of the influencer (Liu & Wang, 2025; Stein et al., 2022).

While these traditional research aims to explain the influencer-follower relationship in the context

of human influencers, a new phenomenon of virtual influencers (VI) has been observed. Scholars have defined VIs as "computer-generated personas built using CGI technology that are designed to look, behave, and communicate like real people on social media" (Thomas & Fowler, 2021; Lou et al., 2023). Unlike HIs, these VIs do not have any real experiences or emotions but are entirely managed by brand teams or creative agencies who project such human characteristics to increase their credibility (Barari et al., 2025; Jayasingh et al., 2025). In recent times, the objectivity and controllability of these VIs have lured major brands towards them for collaborations. Major advantages of VIs are their scalability and reduced risk of personal scandals, which would pose a threat to brand image (Barari et al., 2025). The growing popularity of VIs like Lil Miquela and Imma provides evidence of how VIs can attract followers and generate meaningful consumer engagement. This further makes them a viable option for both marketers and researchers to consider as an important marketing tool (Ferraro et al., 2024; Djafarova & Davies, 2025).

The rise of VIs has prompted a growing stream of research that compares their effectiveness with HIs across various consumer outcomes, including engagement, purchase intention, trust, and perceived authenticity *(Ameen et al., 2024; Igarashi et al., 2024; Zeng & Lin, 2025).* The findings from these studies, however, have not been consistent. Some studies conclude that HIs are more effective because they are seen as more authentic and emotionally relatable *(Djafarova & Davies, 2025; Willemsen et al., 2025),* while others find that this advantage disappears or even reverses under certain conditions *(Lee et al., 2024; Omeish & Ashour, 2025).* This inconsistency across studies suggests that influencer type alone does not determine consumer outcomes and that there are important psychological and contextual variables that moderate and mediate this relationship, many of which remain underexplored.

One such variable is machine heuristics, which refers to the cognitive tendency of individuals to assume that machine-generated content is more objective and unbiased than content produced by humans *(Sundar, 2008). Lee et al. (2024)* found that consumers who hold stronger machine heuristic beliefs tend to view VIs as more authentic and credible than HIs, effectively reversing the typical pattern seen in the literature. This suggests that individual-level differences in how people perceive AI can significantly change their response towards AI. This further supports the importance of machine heuristics as a boundary condition which needs further exploration.

Against this backdrop, the following literature review aims to understand the key variables and

mechanisms relevant to this area of study. First, it reviews comparative literature on Human and VIs, and the relative effectiveness of each *(Section 3.1)*. Next, it examines two key psychological mechanisms: the credibility of information sources *(Section 3.2)* and parasocial interaction *(Section 3.3)*. These variables would help explain why, under certain conditions, one type of influencer tends to outperform the other. Moving ahead, the review focuses on the emerging role of machine heuristics as a cognitive bias and moderator *(Section 3.4)*. In the final sections, the literature highlights the two core outcome variables of this study. Based on recent empirical research, the review aims to understand how the aforementioned variables affect consumer engagement and purchase intention (Sections 3.5 and 3.6). These sections collectively lay the foundation for identifying the research gaps of the study, along with proposing a conceptual framework to guide this study.

3.1 Studies Examining the Effectiveness of VIs vs His

Over the past decade, influencer marketing has observed exponential growth. It has transitioned from popular celebrity endorsements to being a social media phenomenon involving social media influencers (SMIs) who function as relatable opinion leaders embedded within digital communities. SMIs pose a strong influence on major behavioural attributes such as consumer attitudes by sharing personal narratives and product experiences in ways which seamlessly blur the boundary between commercial and non-commercial content *(Freberg et al.,2011; Schouten et al.,2020)*. In recent development, the advancement of artificial intelligence (AI) and its generative capabilities have paved the way for computer-generated images (CGI), which have further introduced VIs (VIs)—"*digitally created personas that mimic human appearance, personality, and social interaction patterns*" *(Thomas & Fowler, 2021; Lou et al., 2023).* These VIs, unlike their human counterparts, are algorithmically controlled entities that are designed and managed by creative teams or brands. Their major point of appeal lies in the fact that they are controllable, scalable and have reduced reputational risk, which positions them as an attractive strategic asset for brands *(Barari et al.,2025; Jayasingh et al., 2025)*. Scholars have conducted a few studies examining how HIs compare to VI and the factors which play a significant role in this relationship. Below, we present review of recent empirical studies examining consumer responses to HIs in comparison to VIs.

Ameen et al. 2024 studied the HIs and VIs impact specifically in the tourism context. A survey of 493 participants, along with a between-subjects design experiment with 470 participants, was conducted to study the tourist intentions to visit a destination. The model was based on trust and risk theory, where destination trust mediates the effect of consumers' knowledge on perceived risk, and the type of influencer moderates how trust leads to intention. The authors found a significant impact on the effect of the message when an influencer was human vis-a-vis a virtual influencer. The positive posts by HIs led to an increased travel intent as compared to VIs. Thus, the authors conclude that the effectiveness of VIs was comparatively lower than that of HIs in certain persuasive contexts, especially when the cues to credibility or positivity differed by influencer type.

Igarashi et al. (2024) compared HIs and VIs through 4 experiments in the context of promoting social causes. The results of this study report that the persuasiveness of HIs was found to be higher than that of VIs. However, it was also observed that this difference was significantly higher when the virtual influencer was perceived as a standalone influencer without any popular brand affiliation. When the same VI was presented in a clear brand-affiliated context, the effectiveness equaled that of a human influencer. The researchers attributed this to homophily and post-authenticity contexts. This means that HIs are capable of creating stronger feelings of similarity and authenticity, thus, leading to higher persuasion. The study also suggests that the effectiveness of VIs is not intrinsic but also depends on contextual cues. Thus, the study finally concludes that brand cues and influencer type together shape credibility and outcomes.

Zeng & Lin 2025 conducted a 2x2x2 online experiment with 468 participants to understand the consumer evaluation of human vs. VIs. In this study, the impact of influencer type, product (hedonic vs. utilitarian), and gender were examined. The results found no direct effect of influencer origin on the perceived attractiveness or authenticity. However, findings suggest that social similarity was an antecedent to these factors. The study further concludes that a hedonic consumption motive led to higher purchase intention. Furthermore, this study suggests that VIs can be as effective as HIs if their similarity is relatable to the consumers. The study finds its theoretical strength in social identity and motivation theories. This study therefore, describes the role of motivational states and factors in deciding the effectiveness of VIs.

Djafarova & Davies (2025) conducted a mixed-method study comparing TikTok-based human and VIs who endorse fashion and beauty products. They noted the performance of both categories across key outcomes like follower trustworthiness, expertise, and influence over purchase intentions. The results reported that HIs scored higher than VIs in terms of generating purchase intention. The study also suggests the existence of conditional credibility in the context of VIs. This means that VIs may be perceived as experts and trusted occasionally based on situational factors. The quantitative analysis in the study highlighted the uncanny valley effects and concluded that content quality was perceived differently for different types, which further shaped the parasocial relations.

Williamsen et al. (2025) used an experiment in their study where they used mind perception theory to understand the consumers' perception of human-like VIs (HVIs) vs. HIs. The study finds multiple effects, like consumers finding HVIs possess less intentionality, which makes it harder to detect persuasion intent. Also, HVIs were perceived to have fewer emotions, thus making them less authentic. Overall, the participants were found to be more sceptical of HVIs than their human counterparts. It was concluded that HVIs lacked a persuasive advantage as the consumers sensed their machine origin, even if they seemed like a human. The study uses PLS-SEM analysis to find that the lower emotional attribution to VIs was the reason behind the low effectiveness. Thus, the study provides insight into cognitive and emotional pathways through which the influencer type affects persuasion.

Despite the popularity and growing prevalence of VIs, there are limited studies establishing the comparative advantage of humans vs. VIs. While several studies suggest HIs as being more authentic and emotionally relatable *(Lou et al., 2023),* contemporary research also indicates that VIs can be perceived as equally or even more authentic under certain cognitive conditions. *Lee et al. (2025),* in their research, demonstrate that individuals who have a higher orientation towards machine heuristic beliefs, i.e., assuming machines are objective and unbiased, tend to perceive VIs as more authentic in comparison to HIs. *Ferraro et al. (2024)* have highlighted the effect of novelty and aesthetic appeal of VIs to have a positive effect on engagement and follow-up intention. These results reveal that it is unclear if VIs are superior and receive more positive responses than HIs or vice versa. Thus, there is a need to examine possible psychological mechanisms that make one type of influencer more convincing than the other one under specific contexts. Based on a thorough review of the literature, we identified two possible psychological mechanisms, namely,

source credibility and parasocial interaction, which may explain the superiority of one type of influencer over the other.

3.2 Role of Source Credibility in Influencer Marketing

In the context of influencer marketing, credibility has been consistently used as a critical mechanism that leads to trust, engagement, and finally purchase intention *(Jin et al., 2019)*. The theory of source credibility was proposed by *Hovland and Weiss (1951)*, which provides a foundational explanation for customer persuasion by influencers. Later, *Ohanian (1990)* explained the constituents of source credibility as perceived expertise, trustworthiness, and attractiveness. Below, we review key studies in the domain of influencer marketing which explain how credibility is established for both HI and VIs and its subsequent effect on consumer outcomes.

Jha et al., (2025) conducted a survey of 326 fashion influencer followers to model the factors leading to trust and test its subsequent effect on purchase intention. By using PLS-SEM, they conclude that credibility is an influencer that includes expertise and trustworthiness, and it has the strongest impact on consumer trust (β=0.541) and further on purchase intention (β=0.821). In the case of VIs, this impact was found to be lower (β=0.176). The model of this study was based on the source credibility theory *(Ohanian, 1990)* and further confirms that trust fully mediates the relationship between credibility and purchase intention. The study concludes that "credibility is king," which drives trust and further leads to purchase intention.

Lim & Lee (2023) conducted a 2x2 experiment to study how origin disclosure, which means revealing the influencer is AI, and content affect the credibility of a VI. The study finds that disclosure leads to lowered humanness and therefore reduces initial trust. However, when the VIs' content is positive and uses emotional cues, the parasocial interaction (PSI) grows, and this leads to better credibility. The study uses source credibility and parasocial interaction theories and explains how better parasocial interactions boost credibility. The study thus concludes that PSI mediates the effect of origin and content on perceived credibility.

Omeish & Ashour (2025) surveyed TikTok users in Egypt/Jordan to test parasocial and social capital theories. This study finds that VIs are capable of building the same level of credibility as

compared to HIs. Using PLS-SEM, it is suggested that parasocial factors and source credibility further help to predict eWOM and loyalty regardless of the type of influencer. The key aspect of the study lies in exhibiting the parity between VIs and HIs. It further concludes that under the right conditions, it is possible to overcome the credibility gaps completely and creates a possibility for VIs to be higher in credibility than HIs.

In the context of VIs, credibility has been observed to be operating through various conditions. *Jayasingh et al. (2025)* explain that the credibility of AI influencers is a critical determinant of consumer engagement and purchase intention. *Zourrig et al. (2025)* propose how anthropomorphic design elements, namely warmth and competence, contribute to enhancing the persuasive impact. *Lee et al. (2025)* further emphasise that while HIs draw their credibility from real-life experiences, VIs are deemed more credible on the basis of their sense of objectivity, consistency and technological precision. Thus, it can be concluded that influencer type has been theorised to contribute to perceived source credibility, which further influences the behavioural responses.

3.3 Role of Parasocial Interaction in Influencer Marketing

Beyond cognitive factors like credibility, the effectiveness of an influencer is also driven by relational mechanisms such as parasocial interaction (PSI). *Horton and Wohl (1956)* conceptualised parasocial interaction as "*an illusion of a face-to-face relationship between media consumers and media personas*." In digital environments, PSI has been observed to strengthen emotional attachment and thus contribute to enhanced persuasive influence. Across various research studies, it has been observed that parasocial bonds formed with VIs can meaningfully predict the behavioural outcomes of a consumer. *Al Asheq et al. (2025)* observed that the visit intention in the tourism context was directly impacted by the PSI with the virtual influencer. In the upcoming paragraphs, we review contemporary literature to understand parasocial interaction in the context of both HI and VIs.

Stein et al. (2022) performed a preregistered experiment with 179 participants to compare the parasocial interaction between humans vs VIs. They used a video stimulus and concluded no overall advantage for humans. The results reported that the PSR levels were statistically indistinguishable for HIs vs VIs. However, there were countervailing mediators where the participants felt instant PSI with the VIs. The participants also perceived the VI as less human-like, which then reduced the effect. Thus, the study concludes that PSR can form strongly with VIs

under the right conditions. It further suggests the PSI is affected by other underlying factors other than just the type of influencer.

Liu & Wang (2025), in their study, integrate the uncanny-valley theory with PSI. They conducted a survey of 826 participants (Instagram users) to model how VI anthropomorphism affect PSR. The findings suggest that the higher the humanness, the greater the parasocial bond. This study also identifies two mediators, namely trustworthiness and wishful identification. The perceived free will of VI moderates the relationship, which contradicts the classic uncanny valley expectations where the connection between anthropomorphism and trustworthiness was more linear. This further suggests that VIs benefit from human-like traits. The study also compares "prospective" vs "established" followers and concludes that each group uses different cues to form PSR.

Saumer et al. (2025) conducted an experiment with 443 participants. The study compared real, human-like CGI and cartoon CGI influencers that gave insomnia advice. The results reported that PSI was strongest for real HIs and weakest in the case of cartoon-like VIs. Also, the strong PSI levels were found to be related to health behaviour intentions. These findings suggest that VIs may find it difficult to create the same connection as humans. However, this research highlights a gap where VIs may be able to build PSR, but their credibility may be dependent on other factors which moderate the relationship.

Contemporary research also suggests that although parasocial relationships with VIs are possible, they are often found to be weaker than those formed with HIs because of the differences, such as emotional capacity. *(Saumer et al., 2025; Willemsen et al., 2025)*. Therefore, it can also be said that influencer type is crucial in determining the degree to which consumers develop parasocial bonds, which would further have an effect on consumers' behavioural responses.

3.4 Role of Machine Heuristics in Influencer Marketing

Machine heuristics refers to the cognitive shortcut where individuals have a biased assumption that machine-generated outputs are objective, accurate and unbiased *(Sundar, 2008)*. This theory further aids the understanding of consumer responses to artificial agents. *Lee et al. (2025)* have further explored this concept and found that individuals with higher belief in machine heuristics tend to attribute greater value of authenticity to VIs, thus examining machine heuristics in a

moderating role. In the coming paragraphs, a review of further research has been conducted to explore this relationship further.

Lee et al. (2024) have tested the concept of machine heuristics in an online experiment and its effect on perceived authenticity of influencers for both human and VI. The study reports an interaction where the participants who were high on machine heuristics, i.e. believed strongly in the objectivity of machines, found VI to be more authentic and vice versa. The study further models perceived authenticity leading to trust and finally purchase intention. Using PROCESS mediation, they confirmed that under high machine heuristics, VIs tend to outperform HIs on the aspect of credibility and influence. Thus, it can be concluded that individual differences in AI attitudes flip the usual HI vs VI findings.

Barari et al. (2025) in their experimental study reported that extremely human-like VIs yields mixed outcomes. They concluded that high anthropomorphism boosted consumer engagement metrics but it also in turn triggered an upwards social comparison which led to reduced subject well-being. The theoretical background of the study is self-discrepancy theory. Although the study doesn't directly quote machine heuristics, the results imply that more realism can bring its own psychological costs. They also highlighted an important gap that most studies have not yet explored: the negative consumer reactions to near-human VIs.

Limited research has been undertaken studying the role of machine heuristics to understand its effect on PSI and if the relationship strength is affected when individuals act based on algorithmic biases. Thus, there stands a clear gap where this relationship needs to be further explored in order to understand the relationship of influencer type and its effect on purchase intention.

3.5 Impact of Influencer Marketing on Consumer Engagement

The use of VIs in marketing strategies has increased widely, and thus, it becomes important to understand what drives consumer engagement with VIs. Engagement reflects the meaningful interactions of the target audience with influencer content, which further leads to subsequent consumer behaviour *(Cao et al., 2025; Jha et al., 2025).* The studies mentioned below examine key factors that influence engagement in VI contexts, including perceived value, credibility, and

interactivity *(Barari et al., 2025, Kim & Wang, 2024)*, and their collective findings for how engagement functions within the consumer decision process.

Cao et al. (2025) surveyed over 700 Chinese social media users and examined how the various perceived value dimensions, such as informativeness, entertainment, incentives, and novelty, have an effect on engagement with the influencer content and purchase intention. The study used PLS-SEM, and the findings conclude that consumer engagement directly drives purchase intention and also reinforces perceived value. It was also noted that entertainment and incentives did not have any direct effect on purchase once engagement was accounted for. This further confirmed that engagement solely carries these effects forwards. Source credibility also had an amplifying effect on outcomes, which means the higher the credibility of the influencer stronger was the engagement and the higher the purchase intention.

Jha et al., (2025) found that VI engagement, which was measured through interactive features and perceived responsiveness significantly predicted consumer trust (β =0.176). These factors, when combined with source credibility (β =0.541) show that their combined effect produces stronger trust outcomes. These findings suggest that engagement and credibility are not independent. And thus, this relationship becomes an important determinant of purchase intention.

Kim & Wang (2024) in their comparative study of HI vs VIs found that VIs can have the same effect on customer engagement when authenticity and credibility cues are strong. This study was conducted for charity campaigns specifically. The study also suggests that in commercial settings, HIs hold an advantage. Thus, it has been concluded that VI engagement is sensitive to the perceived authenticity of the context rather than being dependent on the influencer characteristic.

Thus, it can be concluded from the above review that consumer engagement with influencer content is not driven by any single factor but is the result of multiple interacting elements. Furthermore, across literature customer engagement has emerged as an important contributor to consumer decision making process, ultimately influencing consumer purchase decision (Cao et al., 2025).

3.6 Impact of Influencer Marketing on Purchase Intention

Across marketing literature, several studies widely study purchase intention as a final outcome variable to understand the final behavioural outcome of the consumer. There are substantial studies which study the relationship of variables like credibility, parasocial relationships and its final effect on the consumer buying behaviour. The following review discusses important studies that have examined the role of influencer type, and other factors on purchase intention.

Igarashi et al. (2024) in their study suggest that HIs were able to build stronger prosocial bonds than VIs, further indicating the higher persuasiveness of HIs. The study concludes that behavioural intention is higher when consumers feel higher authenticity in engagement and higher credibility of the influencer. Thus, suggesting that purchase intention depends on variables like credibility of the influencer and their perceived authenticity.

Cao et al. (2025) in their work explicitly studied purchase intention. The findings of the study discuss that informativeness, entertainment and incentives have a positive and direct effect on purchase intention. Whereas the effect of novelty remains negative. The study also captured a fully mediating role of engagement and perceived value. This means that for VIs, simple characteristics like novelty do not directly affect the behavioural outcomes. The study used the SEM approach and showed significant indirect effects, thus reflecting engagement being a key predictor of purchase.

Kim & Park (2023) conducted a study to understand the effect of VI attractiveness on purchase intention. The finding reveals that there is no direct effect of VI attractiveness on purchase intention; rather, it operates through mimetic desire and brand attachment. This means that when consumers desire to copy or emulate the influencer and feel attached to the brand, the purchase intention increases. In the moderated mediation model, with product-endorser fit as a moderator, the study demonstrated that the physical attractiveness or appearance only mattered when any downstream psychological motives were triggered.

The review above helps in collectively establishing that the effectiveness of influencer marketing, whether through HI or VI, is not a straightforward function of the type of influencer. It is rather shaped by a complex interplay of psychological relations and contextual factors. Across the

reviewed studies, source credibility has consistently emerged as a significant factor which drives consumer trust and purchase intention *(Jha et al., 2025; Ohanian, 1990).* It has also been noted that PSI is a key mechanism through which consumers build emotional bonds with the influencer, which further leads to behavioural outcomes *(Horton & Wohl, 1956; Liu &Wang,2025).* The literature, though limited, also examines that individual-level cognitive biases, such as machine heuristics towards AI and machine-generated content, can meaningfully change the consumer perception and responses towards different types of influencers *(Lee et al., 2024; Sundar, 2008)*.

The literature review further shows that consumer engagement and purchase intentions are vital outcome variables in the context of influencer marketing, and many studies have examined them as the key dependent variables. Moreover, we found that while some studies have examined various moderators and mediators which influence the impact of influencer type on final consumer outcomes, more research on these aspects will benefit the growing yet novel field of influencer marketing. Moreover, with the influx of VIs competing against HIs, it becomes important to examine the underlying factors which play a pivotal role in influencing their persuasiveness *(Cao et al., 2025; Kim & Park, 2023).* These findings collectively point towards the need for examining these complex relationships, and identifying the role played by source credibility, parasocial interaction, and machine heuristics in shaping consumer outcomes while receiving information from HIs vs. VIs.

3. Research Gaps

Despite the growing volume of research on VIs, several important gaps remain in the existing literature that limit a comprehensive understanding of how influencer type affects consumer behaviour and what underlying mechanisms lead to such differences. Based on a detailed literature review, the following gaps were identified:

RG1: Literature suggests that HIs often outperform VIs due to factors such as higher perceived authenticity and emotional relatability *(Ameen et al., 2024; Williamsen et al., 2025; Djafarova & Davies, 2025);* however, some suggest that this advantage is not universal and VIs may perform better (*Igarashi et al., 2024)* or perform similar to HIs (Zeng *& Lin, 2025).* Thus, more empirical research is needed to examine whether HIs outperform VIs under certain contexts and for particular product types.

RG2: Few studies have examined the role of source credibility *(Jha et al., 2025; Djafarova & Davies, 2025)* and parasocial interaction *(Stein et al., 2022; Liu & Wang, 2025)* as psychological mechanisms influencing consumer outcomes in the domain of influencer marketing. Nevertheless, additional research is needed to examine the underlying factors that may explain the superiority of one type of influencer over another *(Barari et al., 2025)*. The relative contribution of each mechanism and whether they operate independently or in conjunction remains insufficiently understood. Therefore, this becomes a notable gap. Consumers are likely to draw on both cognitive assessments of credibility and parasocial relationships while evaluating or engaging with influencer content.

RG3: *Lee et al. (2024)* provide early evidence that individuals high on machine heuristic beliefs perceive VIs as more authentic, effectively reversing the typical human influencer advantage. It is found that the role of machine heuristics has received limited empirical attention in the context of influencer marketing, with the only published study being *Lee et al. (2024)* to date. However, the influence of machine heuristics on underlying psychological mechanisms, which in turn leads to differences in consumers, seems highly plausible and thus needs exploration. It remains unclear whether consumers' machine heuristics beliefs affect mechanisms such as source credibility and parasocial interaction, further leading to varied behavioural outcomes.

4. Proposed Research Objectives

Drawing from the identified gaps, this study aims to achieve the following objectives:

Objective 1: To examine the effect of human vs. virtual influencer on consumer engagement and purchase decisions.

Objective 2: To assess whether source credibility and parasocial interaction serve as psychological mechanisms that account for the relative superiority of one influencer type over the other in eliciting stronger consumer responses.

Objective 3: To examine whether machine heuristics act as a cognitive bias and influence source credibility and parasocial interaction. Further, to examine if this indirect effect varies depending

on machine heuristics (high or low), such that the mediating roles of credibility and parasocial interaction become stronger or weaker, which in turn influences consumer outcomes.

5. Proposed Research Questions

In line with the research objectives, this study seeks to address the following research questions:

RQ1: Does influencer type (human vs virtual) have a significant direct effect on consumer engagement and purchase intention?

RQ2: Does source credibility mediate the relationship between influencer type and consumer engagement and purchase intention?

RQ3: Does parasocial interaction mediate the relationship between influencer type and consumer engagement and purchase intention?

RQ4: Do machine heuristics moderate the relationship between influencer type and source credibility, such that the effect is stronger for individuals with higher machine heuristics beliefs?

RQ5: Do machine heuristics moderate the relationship between influencer type and parasocial interaction, such that the effect is stronger for individuals with higher machine heuristics beliefs?

RQ6: Do machine heuristics condition the indirect effect of influencer type on consumer engagement and purchase intentions through source credibility and parasocial interaction, constituting a moderated mediation effect?

6. Proposed Conceptual Framework

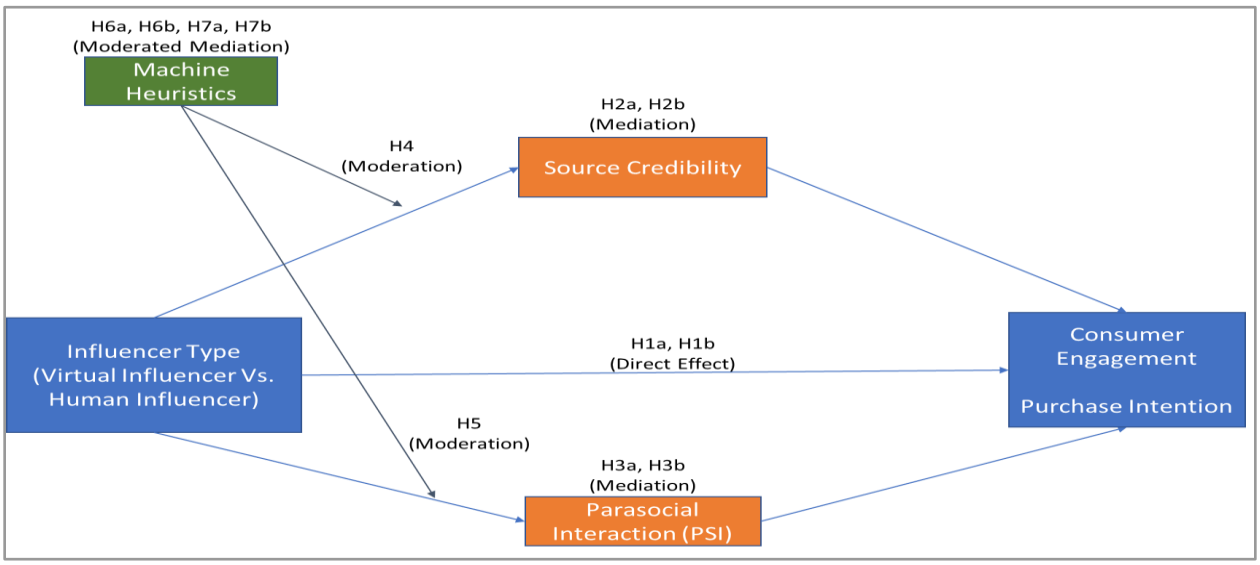


Figure 2: Proposed Conceptual Framework (Own Work)

7. Proposed Hypothesis and Structure

To achieve the proposed research objectives and to examine the various hypotheses, two experimental studies would be conducted. The first study would examine the main effect of influencer type on consumer responses and the role of source credibility and parasocial interaction as possible mediators. The second study would primarily examine the role of machine heuristics as a possible mediator affecting source credibility and parasocial interaction, and the possible effect of these together (machine heuristics and source credibility, and machine heuristics and parasocial interaction) by examining moderated mediation. Given that examining all these relationships in a single experimental study is not advisable, the second study would serve as a constructive replication *(Bergkvist & Langner, 2023)*.

Study 1

H1a: HIs will generate higher consumer engagement compared to VIs.

H1b: HIs will generate higher purchase intention compared to VIs.

H2a: Source credibility mediates the relationship between influencer type and consumer engagement, such that HIs generate higher perceived source credibility, which in turn drives greater consumer engagement.

H2b: Source Credibility mediates the relationship between Influencer Type and Purchase Intention, such that HIs generate higher perceived Source Credibility, which in turn drives greater Purchase Intention.

H3a: Parasocial interaction mediates the relationship between influencer type and consumer engagement, such that HIs generate stronger PSI, which in turn drives greater consumer engagement.

H3b: Parasocial interaction mediates the relationship between influencer type and purchase intention, such that HIs generate stronger PSI, which in turn drives greater purchase intention.

Study 2

H4: Machine heuristics moderate the effect of influencer type on source credibility, such that subjects high in machine heuristics find VIs more credible than HIs, while people with low machine heuristics will find HIs more credible.

H5: Machine heuristics moderate the relationship between influencer type and parasocial interaction, such that subjects high in machine heuristics will have stronger parasocial interaction with VIs than with HIs.

H6a: The indirect effect of influencer type on consumer engagement through source credibility is moderated by machine heuristics, such that when machine heuristics are high, the indirect path is stronger for VIs.

H6b: The indirect effect of Influencer Type on Purchase Intention through Source Credibility is moderated by machine heuristics, such that when machine heuristics are high, the indirect path is stronger for VIs.

H7a: The indirect effect of influencer type on consumer engagement through parasocial interaction is moderated by machine heuristics, such that high machine heuristics reduce the PSI-mediated advantage of HIs over VIs in driving consumer engagement.

H7b: The indirect effect of influencer type on purchase intention through parasocial interaction is moderated by machine heuristics, such that high machine heuristics reduce or reverse the PSI-mediated advantage of HIs over VIs in driving purchase intention.

Table 1: Hypothesis Structure

Number	Study	Category	Pathway	Description
H1a	Study 1	Direct Effect	Influencer Type → Consumer Engagement	VI vs. HI effect on CE

H1b	Study 1	Direct Effect	Influencer Type → Purchase Intention	VI vs. HI effect on PI
H2a	Study 1	Mediation	IT → Source Credibility → Consumer Engagement	SC mediates IT→CE
H2b	Study 1	Mediation	IT → Source Credibility → Purchase Intention	SC mediates IT→PI
H3a	Study 1	Mediation	IT → Parasocial Interaction → Consumer Engagement	PSI mediates IT→CE
H3b	Study 1	Mediation	IT → Parasocial Interaction → Purchase Intention	PSI mediates IT→PI
H4	Study 2	Moderation	Machine Heuristics × IT → Source Credibility	MH moderates IT→SC
H5	Study 2	Moderation	Machine Heuristics × IT → Parasocial Interaction	MH moderates IT→PSI
H6a	Study 2	Moderated Mediation	MH moderates the IT→SC→CE indirect path	MM: SC pathway on CE

H6b	Study 2	Moderated Mediation	MH moderates the IT→SC→PI indirect path	MM: SC pathway on PI
H7a	Study 2	Moderated Mediation	MH moderates the IT→PSI→CE indirect path	MM: PSI pathway on CE
H7b	Study 2	Moderated Mediation	MH moderates the IT→PSI→PI indirect path	MM: PSI pathway on PI

10. Proposed Methods

Two experimental studies will be conducted. H1a to H3b will be examined through Study 1, while H4 to H7b will be examined through Study 2.

1. Study 1

Experimental Design Technique: Quasi-Experiment

Design: A one-factor between-subject design (Influencer Type: Human vs. Virtual) will be used. A between-subjects design will ensure there are no carryover, fatigue, or practice effects.

Stimuli and Procedure: Subjects will be exposed to a short influencer marketing reel (stimulus) featuring either a Human or a Virtual influencer endorsing a fictitious brand. The study would be conducted in a controlled environment with each subject viewing the stimulus on a computer screen. Small groups of participants (around 15) would first be instructed to gather in a computer lab with identical computers and instructed to go through the stimuli with the purpose of evaluating the influencer marketing post, disguising the actual purpose of the study. To ensure a virtual influencer is not believed to be human (although there would be a disclaimer), the subjects will be informed that they will be looking at a post by a virtual influencer. Post viewing the stimuli, the

subjects will be asked to respond to the online questionnaire. Subjects will not be allowed to view stimuli more than once.

Stimuli Creation: A Professional advertising agency will be hired to create two similar influencer marketing reels. First, a short video reel for a product will be shot with a real human being. Subsequently, the same video will be morphed from a human to a virtual influencer using existing generative AI technology.

Sampling (Main Study)

Target Population: Both male and female individuals aged 18 to 30 (emerging and young adults) will be recruited as subjects (Refer Annexure C for Details).

Sampling Method and Eligibility Criteria: The study will use a non-probability convenience and purposive sampling method to recruit participants aged 18 to 30 years who are active social media users and exposed to influencer marketing content. Only eligible participants will be recruited after clearing the pre-screening questionnaire. The subjects would be randomly allocated to one of the treatment conditions.

A smaller sample with similar demographics to the main study will be used for Pre-Tests and Manipulation Checks.

Sample Size: 180 Subjects (Based on Monte Carlo Simulation and G-power analysis with 80% power and a 95% confidence level.)

Pre-Test: A pre-test will be undertaken to determine the most suitable product or service for the study. To control for prior attitudes and biases, a fictitious brand will be employed.

Manipulation Check: A manipulation check will be conducted to ensure that humans and VIs are identified correctly. A disclaimer would be given in case of a virtual influencer.

Variables

Independent Variable: Human Vs. Virtual Influencer

Dependent Variables: Consumer Engagement, Purchase Intention

Mediating Variables: Source Credibility, Para-Social Interaction

Note: Subjects' demographics (age, gender, income, and education) will be collected and controlled through randomisation. Possible covariates (e.g., Trust in Influencers, Attitude Towards AI/Technology) will be collected to analyse potential confounding effects and controlled for if required. Scales for dependent, mediating and moderating variables are given in Appendix D.

Statistical Tests

ANOVA/ANCOVA, Regression, and PROCESS MACRO Model 4 will be used to examine the hypothesis.

2. Study 2

Experimental Design Technique: Quasi-Experiment (Same as Study 1)

Design: Same as Study 1

Sampling (Main Study):

Target Population: Same as Study 1

Sampling Method and Eligibility Criteria: Same as Study 1

Sample Size: 360 Subjects (Based on Monte Carlo Simulation and G-Power analysis with 80% power and a 95% confidence level)

Pre-Test: The product category would be chosen based on the pre-test conducted in Study 1. The product category would differ from that in the first study to improve generalizability.

Manipulation Check: Same as Study 1

Variables

Independent Variable: Same as Study 1

Dependent Variables: Same as Study 1

Mediating Variables: Same as Study 1

Moderating Variable: Machine Heuristics

Scales for the dependent, mediating, and moderating variables are provided in Appendix D.

Note: Control and covariate variables will be handled similarly to Study 1

11. Theoretical and Practical Contribution

This study aims to contribute significantly to the emerging VI literature and the overall influencer marketing domain. It aims to address the ongoing debate about the effectiveness of HI vs VI by providing a more nuanced and contextual explanation. The study explores the underlying psychological mechanisms as possible determinants of consumer outcomes, thus seeking to draw an explanation for how and why differences in the effectiveness of influencers exist. The study also extends the application of traditional theories like source credibility and PSI into the newly developing domain of AI-driven influencer marketing. Most importantly, the study introduces machine heuristics as a critical boundary condition, thereby incorporating individual-level cognitive biases into the influencer marketing research. This further would contribute to a more comprehensive understanding of how consumers process AI-generated content and would substantially contribute to the human-computer interaction literature.

From a practical perspective, the study provides valuable insights for marketers and brand managers. It helps identify when VIs can be used effectively and possibly identify audience characteristics to make the decision of HI vs VI easier. By highlighting the role of credibility, emotional connection and consumer beliefs about AI, the findings can further guide influencer selection, campaign design and overall content strategy. This becomes particularly relevant as brands increasingly invest in AI-driven marketing tools.

12. Proposed Chapterization

1. Introduction
2. Literature Review
3. Research Objectives and Framework
4. Study 1: Research Methodology and Findings
5. Study 2: Research Methodology and Findings
6. Discussion
7. Implications and Future Research

Proposed Month-wise plan of work and targets to be achieved:

	Activities	Months and Year																	
		Apr-26	May-26	Jun-26	Jul-26	Aug-26	Sep-26	Oct-26	Nov-26	Dec-26	Jan-27	Feb-27	Mar-27	Apr-27	May-27	Jun-27	Jul-27	Aug-27	Sep-27
1	Thesis Proposal defense																		
2	Extended Literature Review																		
3	Scale Validation and Questionnaire designing and finalization (Study 1 and Study 2)																		
4	Stimuli Development, Pre-Tests and Manipulation Checks (Study 1 and Study 2)																		
5	Data Collection and Preparation (Study 1)																		
6	Data Analysis and Reporting of Results (Study 1)																		
7	Data Collection and Preparation (Study 2)																		
8	Data Analysis and Reporting of Results (Study 2)																		
9	Thesis Writing																		
10	Publication and other requirements																		
11	Thesis Submission																		

Appendix A: Bibliometric Visualisations

Figure A1: Annual Scientific Production, 2020–2025 (R Software output)

Figure A2: Bradford's Law Distribution — Core and Peripheral Journal Zones

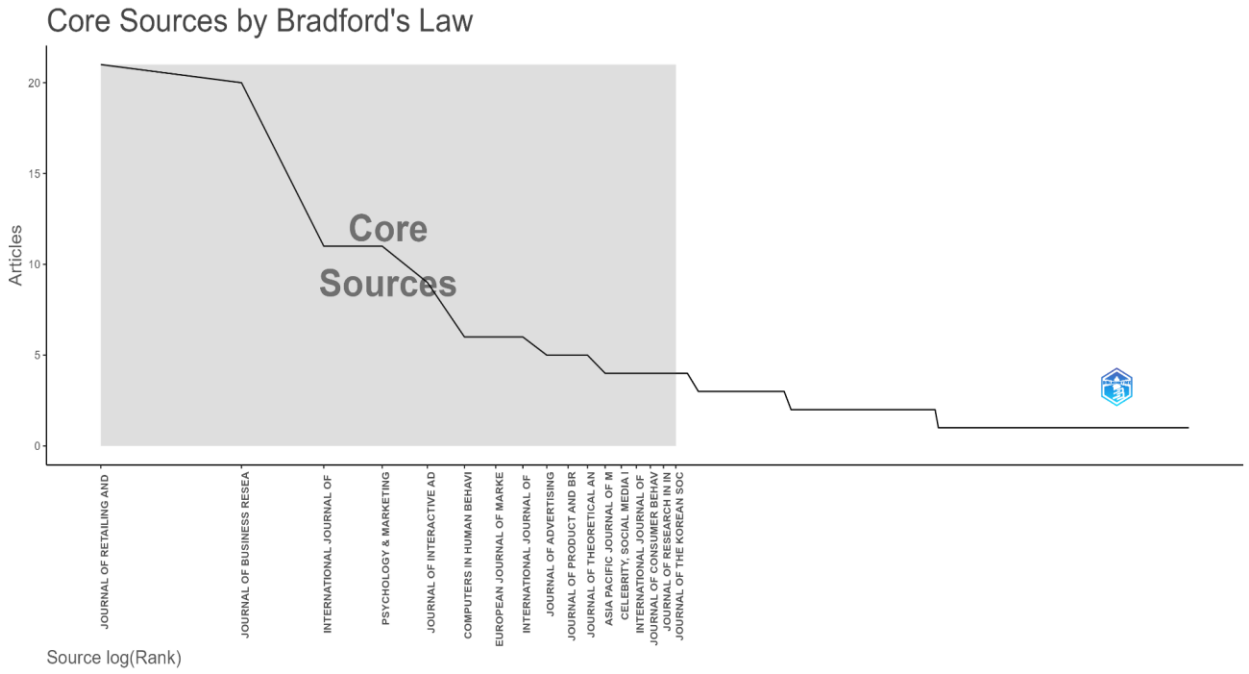


Figure A3: Keyword Co-occurrence Network Map

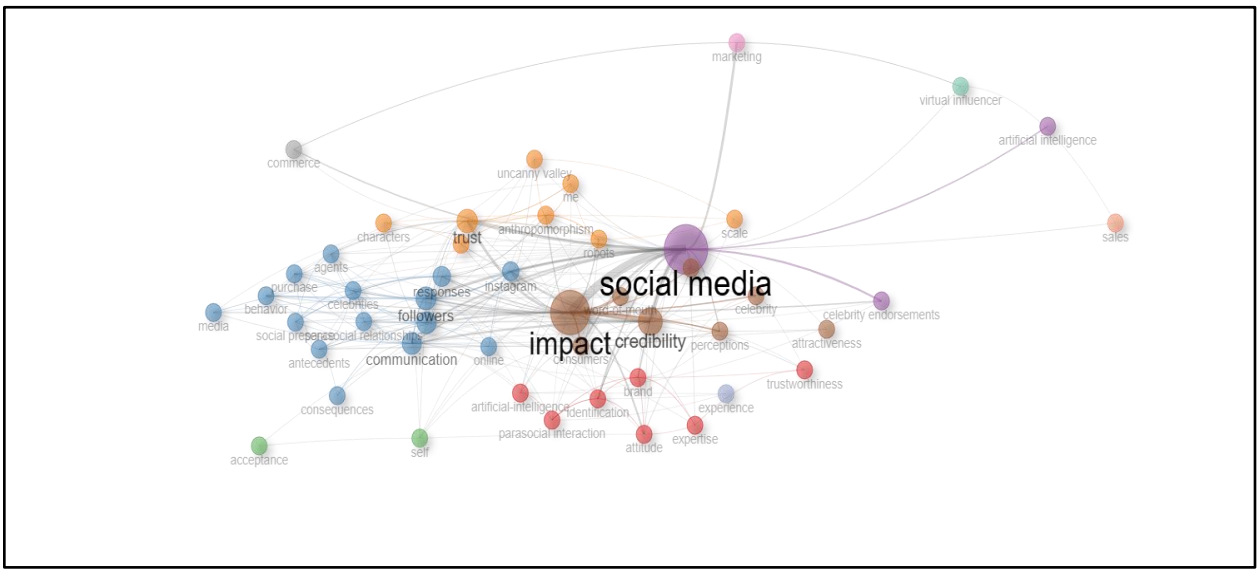


Figure A4: Thematic Map — Strategic Diagram of Research Clusters

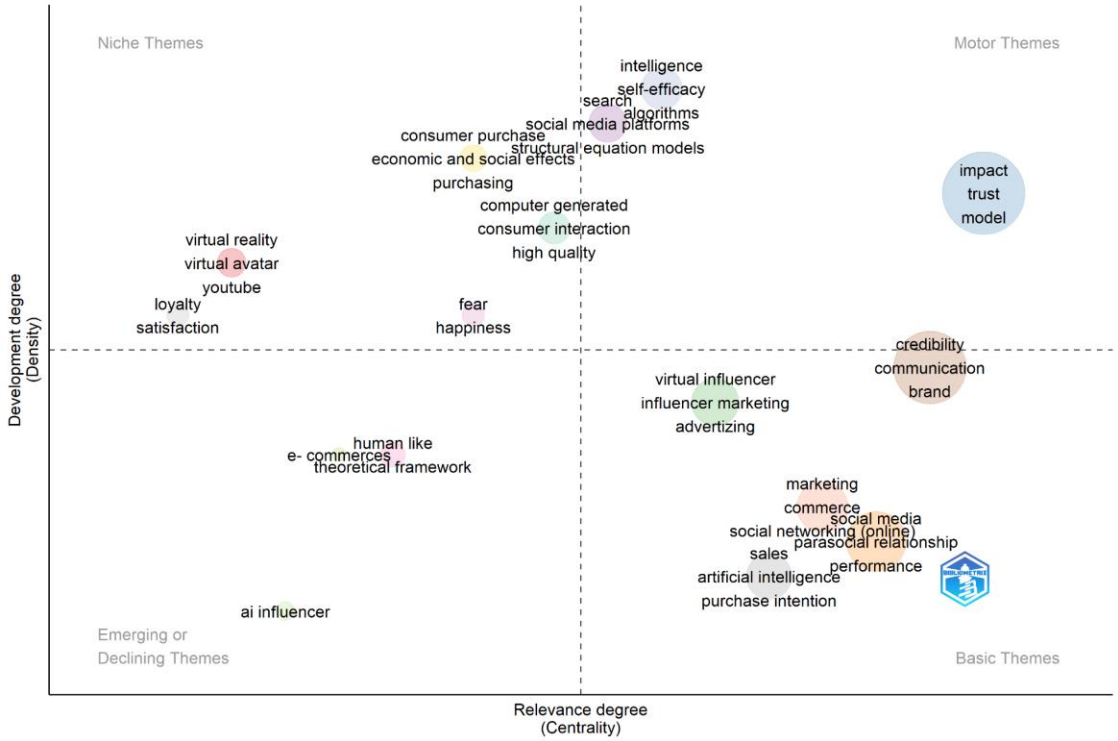


Figure A5: Lotka's Law Distribution — Author Productivity Frequency

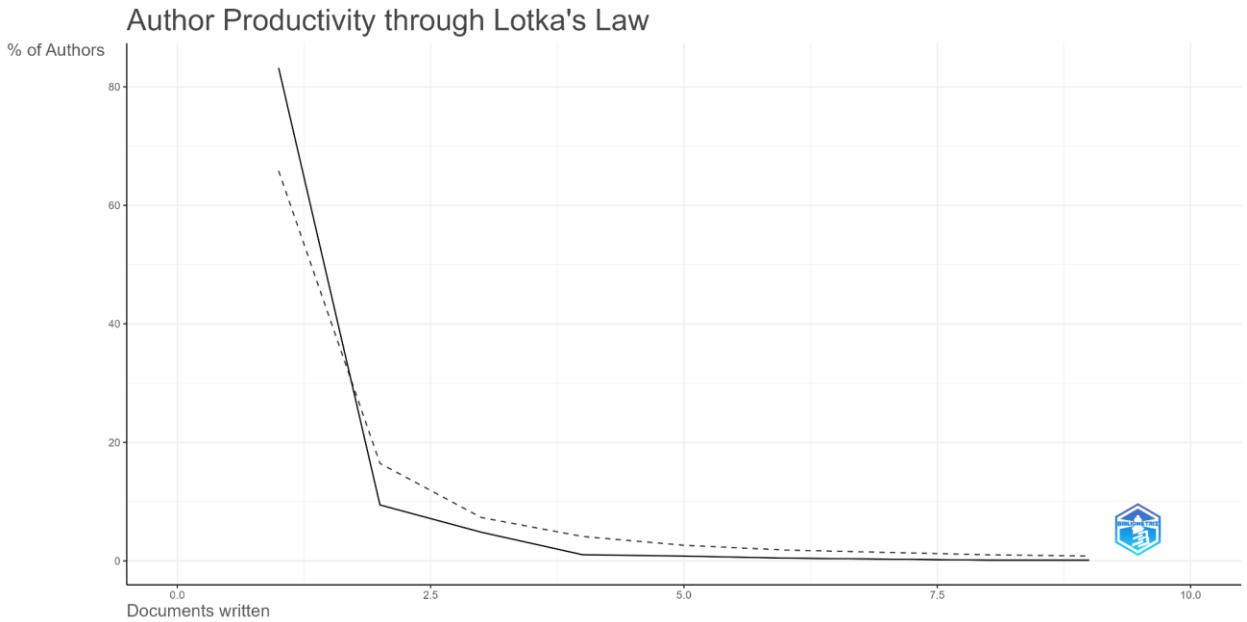


Figure A6: Factorial Analysis of Article Titles — Conceptual Axes

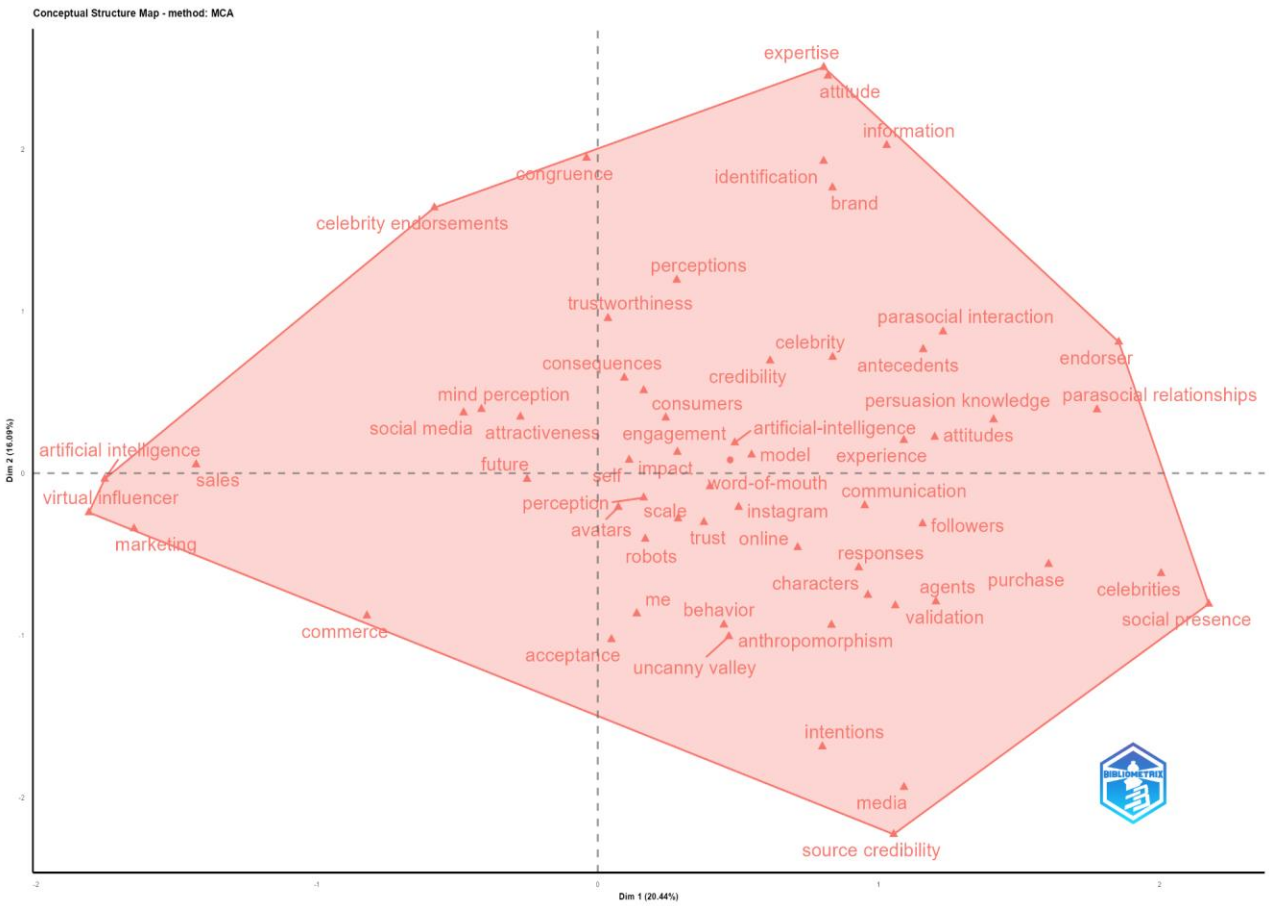
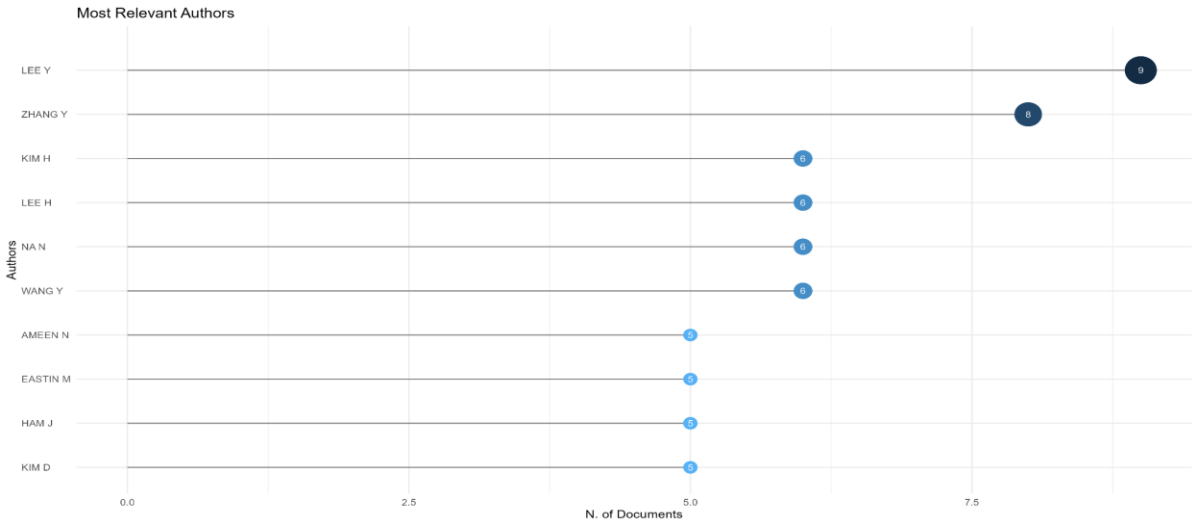


Figure A7: Most Relevant Authors by Publication Count, 2020–2025



Appendix B: Detailed Findings from Reviewed Studies — Organised by Thesis Variable

	SECTION 1: General Influencer Marketing Literature		
S.No.	**Study**	**Area of Focus**	**Key Findings**
1	Freberg et al. (2011)	SMI characteristics, public perceptions, opinion leadership	Social media influencers are perceived as a new type of independent third-party endorser who shape audience attitudes through blogs and social media. Their perceived authenticity and relatability distinguish them from traditional celebrities.
2	Schouten et al. (2020)	Celebrity vs. SMI endorsements: credibility, identification, product-endorser fit	SMIs are perceived as more relatable and credible than traditional celebrities. Identification with the influencer and product-endorser fit strengthen the persuasive impact of SMI endorsements compared to celebrity endorsements.
3	Lou & Yuan (2019)	Influencer marketing: message value, credibility, consumer trust, branded content	Influencer credibility and message value (informational and entertainment) positively affect consumer trust in branded content. Trust, in turn, drives purchase intention and electronic word-of-mouth (eWOM). Credibility mediates the relationship between message value and trust.
4	Tanwar et al. (2022)	Bibliometric analysis of influencer marketing research 2011–2019	Engagement was the most frequently studied influencer objective (54%), followed by purchase intention (13%). Instagram was the dominant platform. Key variables include credibility, parasocial relationships, consumer attitudes, and sponsored content disclosures. Highlights underutilised theories including parasocial interaction and self-perception theory.
5	Ye et al. (2021)	Bibliometric and thematic analysis of influencer marketing literature	Identifies five major research themes: effectiveness of influencer strategies, stakeholder perspectives, ethical concerns and disclosures, influencer identification and selection, and sector-specific influencer marketing. Mixed results on disclosure effectiveness highlight the complexity of transparency in influencer contexts.

6	Awa & Agnihotri (2024)	Influencer marketing effectiveness, ethics, societal implications, AI and VIs	Influencer marketing is more effective than traditional celebrity endorsement due to perceived authenticity. The rise of AI-generated VIs presents both opportunities and challenges. Ethical issues including transparency in disclosures and influencer transgressions require further investigation.
7	Khurana et al. (2024)	Bibliometric analysis of SMI marketing 2011–2022 (Scopus, N=560)	Publications in influencer marketing have grown significantly since 2018. The most prominent research themes include purchase intention, credibility, authenticity, and advertising effectiveness. Highly cited papers emphasise the role of influencer credibility and message value in shaping consumer trust.
8	Kumar et al. (2024)	Systematic review of influencer marketing using VOSviewer (N=74 Scopus papers)	Trust and authenticity are identified as core drivers of consumer behaviour in influencer marketing. Influencers are categorised into celebrity, mega, macro, micro, and nano types with varying impacts. Research gaps include long-term brand loyalty effects and AI/VR integration in influencer contexts.
9	Wilkie et al. (2022)	Source credibility model, signaling theory, influencer efficacy, brand authenticity	Popularity and attractiveness act as heuristic cues informing judgments of influencer efficacy. Brand authenticity sequentially mediates the path from influencer efficacy to brand engagement and attitudes toward posts. Category involvement and altruistic motives moderate reliance on heuristic cues.
10	Balaban & Szambolics (2022)	Self-perceived authenticity of SMIs: sincerity, visibility, expertise, commitment to values	Authenticity from the influencer's perspective comprises sincerity, expertise, uniqueness, commitment to values, spontaneity, transparent brand endorsement, and frequency of interaction. Influencers perceive brand collaborations aligned with personal values as more credible. Platform affordances (e.g., TikTok vs. Instagram) shape how authenticity is performed.

11	Shehzala et al. (2023)	Self-discrepancy theory, perceived homophily, authenticity, self-acceptance, mindfulness	Exposure to influencer content induces self-discrepancies between actual and ideal self. These can generate both positive (motivational) and negative affect. Perceived homophily dampens self-discrepancy effects. Perceived authenticity strengthens positive affect on eWOM and dampens negative affect on purchase intention.
12	Mouritzen et al. (2023)	Conceptualisation of VI marketing: customisation, flexibility, ownership, automation; taxonomy	Distinguishes VIs from HIs and related digital characters across four unique attributes: customisation, flexibility, ownership, and automation. Introduces a 2×2 taxonomy of VIs based on anthropomorphism and the reality–virtuality continuum. Discusses ethical risks of VIs for vulnerable audiences.
13	Ferraro et al. (2024)	Novelty, aesthetic appeal, consumer engagement, follow-up intention (VIs)	The novelty and aesthetic appeal of VIs positively influence consumer engagement and follow-up intention. However, this effect is contingent on individual consumer characteristics such as innovativeness. Novelty alone does not guarantee sustained engagement as the initial effect may wear off.
14	Rohde & Mau (2020)	Social influence heuristics (reciprocity, authority, liking, scarcity, social proof, unity)	Influencers strategically embed all seven social influence heuristics into long-form YouTube content. The heuristic of unity (creating a sense of belonging) is most frequently used. Pre-video disclosures do not effectively help consumers recognise hidden marketing content embedded in organic-style video.
15	Vander Schee et al. (2020)	Consumer factor antecedents, brand engagement dimensions, branding outcomes	Consumer engagement is a multi-dimensional construct comprising affective, cognitive, and behavioural components. Consumer factors including personality traits, motivations, and cultural dimensions serve as antecedents to brand engagement. Engagement leads to downstream brand outcomes including loyalty, trust, and advocacy.

	SECTION 2: Human vs. Virtual Influencer Comparison		
	Study	**Area of Focus**	**Key Findings**
16	Arsenyan & Mirowska (2021)	Consumer reactions to human-like vs. anime VIs	Compared to HIs, human-like VIs elicit significantly lower positive reactions than anime-like VIs and receive the highest level of negative reactions. Appearance realism alone does not guarantee positive consumer responses.
17	Hofeditz et al. (2022)	Perceived trust, social presence, humanness	VIs are perceived as less trustworthy than HIs, generate lower social presence, and are rated as less human-like. These deficits directly reduce their persuasive effectiveness in marketing contexts.
18	Sands et al. (2022b)	Agency, need for uniqueness	AI-integrated VIs are perceived as less trustworthy than HIs. However, for consumers with a strong need for uniqueness, VIs can elicit stronger positive reactions than HIs.
19	Franke et al. (2022)	Labeling, product congruence	Consumers hold more positive attitudes toward HIs. VIs are perceived as more novel and their advertising as more innovative, but novelty alone does not compensate for lower relational warmth.
20	Barari (2023)	Fear of missing out (FOMO), regulatory focus, consumer well-being	Consumers exposed to VI posts show lower well-being than those exposed to HI posts. FOMO mediates the influencer type–well-being link, with a reduced effect for prevention-focused consumers.
21	Böhndel et al. (2023)	Credibility, competence, likability, identity disclosure	When the virtual identity of VIs is not disclosed, they are perceived as less likable than HIs. Non-disclosure reduces the perceived competence advantage VIs might otherwise hold.
22	Nissen et al. (2023)	Perceived trustworthiness, humanness, uncanniness	VIs are significantly less human-like and less trustworthy than HIs, and are rated as more uncanny. These perceptions impair their effectiveness as endorsers.

23	Li et al. (2023)	Sensory cue salience, perceived sensory capability, credibility	Due to limited sensory capability, VIs are less effective than HIs in influencing purchase intention. Concealing their virtual identity can mitigate this negative impact on endorsement effectiveness.
24	Wan & Jiang (2023)	Perceived enjoyment, warmth, trust, live-streaming e-commerce	Consumers perceive VIs as less warm and trustworthy than HIs in live-streaming contexts. Despite this, VIs can achieve a similar level of purchase intention as HIs, suggesting warmth is not always decisive.
25	Kim & Wang (2024)	Campaign context (profit vs. nonprofit), perceived authenticity, purchase outcomes	In profit-driven campaigns, HIs achieve higher consumer outcomes than VIs. In nonprofit campaigns, the two perform comparably. Perceived message authenticity, which is higher in nonprofit contexts, moderates this gap.
26	Ameen et al. (2024)	Trust, perceived risk, destination visit intention, tourism context	HIs generate higher travel intentions than VIs. Destination trust mediates the effect of consumer knowledge on perceived risk, with influencer type moderating how trust translates into intention.
27	Igarashi et al. (2024)	Homophily, post-authenticity, brand affiliation, social cause promotion	HIs outperform VIs in persuasiveness when VIs are presented without brand affiliation. When embedded in a strong brand context, VI effectiveness equals that of HIs. Homophily and post-authenticity drive this effect.
28	Zeng & Lin (2025)	Social similarity, product type (hedonic vs. utilitarian), gender	No direct effect of influencer origin on attractiveness or authenticity when social similarity is controlled. VIs can be as effective as HIs when perceived as relatable. Hedonic motives increase purchase intention regardless of influencer type.
29	Djafarova & Davies (2025)	Trustworthiness, expertise, purchase intention, uncanny valley, TikTok	HIs score higher than VIs on trustworthiness, expertise, and purchase intention. VIs can achieve conditional credibility as experts. Uncanny valley effects shape content quality perception and affect parasocial relations differently by influencer type.

30	Willemsen et al. (2025)	Mind perception, intentionality, emotional attribution, persuasion scepticism	Consumers attribute less intentionality and fewer emotions to human-like VIs than to HIs. HVIs are rated as less authentic. Consumers are more sceptical of HVIs, and lower emotional attribution is the primary mechanism driving reduced persuasive effectiveness.
	SECTION 3: Source Credibility		
	Study	**Area of Focus**	**Key Findings**
31	Hovland & Weiss (1951)	Foundational source credibility theory: expertise, trustworthiness	Proposed that communicator credibility — comprising expertise and trustworthiness — significantly influences message persuasiveness. Established the theoretical foundation for all subsequent source credibility research in marketing and advertising.
32	Ohanian (1990)	Source credibility dimensions: expertise, trustworthiness, attractiveness	Developed and validated the three-dimensional source credibility scale. Expertise was the strongest predictor of purchase intention. This measurement framework is the most widely adopted in influencer marketing research.
33	Lee & Eastin (2021)	Perceived authenticity of SMIs: sincerity, truthful endorsements, visibility, expertise, uniqueness	Developed and validated the PASMI scale. Sincerity and truthful endorsements significantly predict consumer attitude, follow intention, and purchase intention. Expertise affects attitude and follow intention but not purchase directly. Uniqueness affects follow intention only.
34	Naderer et al. (2021)	Sponsorship disclosure, follower-influencer similarity, trustworthiness, purchase intention	Disclosures increase influencer trustworthiness when follower-influencer similarity is high. Trustworthiness positively influences purchase intentions and future engagement. High similarity moderates the negative impact of disclosures on consumer trust.

35	Gamage & Ashill (2022)	Commercial orientation of influencer content, trustworthiness, perceived credibility	Higher commercial orientation in influencer content reduces trustworthiness and perceived credibility. Both variables fully mediate the relationship between commercial orientation and followers' willingness to search for product-related information.
36	Lim & Lee (2023)	Origin disclosure, emotional narrative, PSI, VI credibility	Disclosing a VI's virtual origin reduces perceived humanness and initial trust. When VI content uses positive emotional cues, PSI grows and boosts credibility. PSI mediates the effect of origin disclosure and content valence on perceived VI credibility.
37	Jha et al. (2025)	Source credibility (expertise, trustworthiness), consumer trust (β=0.541), purchase intention (β=0.821)	Source credibility has the strongest effect on consumer trust and trust fully mediates the credibility–purchase intention relationship. VI-specific engagement also predicts trust (β=0.176). Credibility's direct effect on purchase becomes non-significant once trust is included, confirming trust as the proximal mechanism.
38	Omeish & Ashour (2025)	Parasocial factors, source credibility, eWOM, loyalty; TikTok users (Egypt/Jordan)	VIs are capable of building the same level of credibility as HIs. Parasocial factors and source credibility jointly predict eWOM and loyalty regardless of influencer type. Under the right conditions, credibility gaps between VIs and HIs can be fully overcome.
39	Jayasingh et al. (2025)	AI influencer credibility, consumer engagement, purchase intention	Credibility is a critical determinant of consumer engagement and purchase intention for AI influencers. Credibility perceptions of AI influencers are driven more by objectivity and consistency than by personal relatability, distinguishing them structurally from HI credibility.
40	Zourrig et al. (2025)	Anthropomorphic design (warmth, competence), persuasive impact of VIs	Anthropomorphic design elements — specifically warmth and competence — enhance the persuasive impact of VIs. These dimensions operate differently from traditional source credibility cues, suggesting design is a strategic lever for VI credibility.

41	Lee et al. (2025)	Machine heuristics, objectivity, technological precision, VI credibility	VIs are deemed more credible on the basis of objectivity, consistency, and technological precision rather than personal lived experience. Machine heuristic beliefs moderate how strongly consumers attribute authenticity and credibility to VIs versus HIs.
	SECTION 4: Parasocial Interaction (PSI)		
	Study	**Area of Focus**	**Key Findings**
42	Horton & Wohl (1956)	Foundational PSI concept: illusion of face-to-face relationship with media personas	Conceptualised parasocial interaction as the one-sided, illusory sense of intimacy audiences develop with media figures. Established the theoretical foundation for understanding emotional attachment to influencers and its role in shaping persuasive influence.
43	Stein et al. (2022)	PSI comparison: HI vs. VI; human-likeness perception, similarity	Parasocial response levels are statistically indistinguishable for HIs vs. VIs in video contexts. Participants felt instant PSI with VIs but also perceived them as less human-like, partially reducing the effect. PSR can form strongly with VIs under the right conditions and is shaped by factors beyond influencer type alone.
44	Liu & Wang (2025)	VI anthropomorphism, trustworthiness, wishful identification, PSR formation	Higher VI humanness leads to stronger parasocial bonds. Trustworthiness and wishful identification mediate this relationship. Perceived free will of the VI moderates the anthropomorphism–trustworthiness link in a non-linear way. Prospective and established followers use different cues to form PSR.
45	Saumer et al. (2025)	PSI comparison: real, CGI, and cartoon influencers; health behaviour intentions	PSI is strongest for real human influencers and weakest for cartoon-like VIs. Strong PSI is associated with stronger health behaviour intentions. VIs may build PSR but their credibility and PSI strength depend on moderating factors beyond visual realism.

46	Al Asheq et al. (2025)	PSI with VIs, visit intention in tourism	Visit intention in a tourism context is directly and significantly impacted by the strength of PSI formed with the VI. This extends the PSI–behaviour link into the VI domain and supports PSI as a key predictor of consumer behavioural outcomes.
	SECTION 5: Machine Heuristics		
	Study	**Area of Focus**	**Key Findings**
47	Sundar (2008)	Foundational machine heuristics theory: objectivity bias toward AI-generated content	Introduced the concept of machine heuristics as a cognitive shortcut whereby individuals assume machine-generated outputs are inherently objective, accurate, and unbiased. This foundational concept explains why some consumers may assign greater credibility to AI-generated influencers than to human ones.
48	Lee et al. (2024)	Machine heuristic beliefs, perceived authenticity, trust, purchase intention	Individuals high on machine heuristic beliefs perceive VIs as more authentic and credible than HIs, reversing the typical human influencer advantage. Under high machine heuristics, VIs outperform HIs on credibility and persuasive influence. Perceived authenticity mediates the path to trust and purchase intention.
49	Barari et al. (2025)	Anthropomorphism, consumer engagement, upward social comparison, subjective well-being	High anthropomorphism in VIs boosts engagement metrics (clicks, follows) but simultaneously triggers upward social comparison, reducing consumer well-being. Grounded in self-discrepancy theory. Highlights largely unexplored negative consumer reactions to near-human VIs, implying psychological costs of visual realism.
	SECTION 6: Consumer Engagement		
	Study	**Area of Focus**	**Key Findings**

50	Cao et al. (2025)	Perceived value dimensions (informativeness, entertainment, incentives, novelty), engagement, PI	Consumer engagement directly drives purchase intention and reinforces perceived value. Entertainment and incentives show no direct effect on purchase once engagement is accounted for — engagement fully carries these effects forward. Source credibility amplifies engagement outcomes. Engagement and perceived value fully mediate the path from content attributes to purchase intention.
51	Jha et al. (2025)	VI engagement (interactive features, responsiveness), consumer trust, purchase intention	VI engagement significantly predicts consumer trust (β=0.176). Combined with source credibility (β=0.541), both factors produce stronger trust outcomes than either alone, suggesting engagement and credibility operate interdependently rather than in isolation.
52	Kim & Wang (2024)	Campaign context (profit vs. nonprofit), perceived authenticity, consumer engagement	VIs can match HIs in generating consumer engagement when authenticity and credibility cues are strong, as in nonprofit campaigns. In commercial settings HIs retain an engagement advantage. VI engagement is sensitive to the perceived authenticity of the endorsement context rather than fixed influencer characteristics.
53	Barari et al. (2025)	Anthropomorphism, engagement metrics (clicks, follows), social comparison	High visual realism in VIs boosts short-term engagement metrics but simultaneously triggers upward social comparison. This indicates engagement gains from anthropomorphism may carry psychological costs, creating a potential ceiling on the benefits of increasing VI human-likeness.
	SECTION 7: Purchase Intention		
	Study	**Area of Focus**	**Key Findings**

54	Kim & Park (2023)	VI attractiveness, mimetic desire, brand attachment, product-endorser fit	VI attractiveness does not directly increase purchase intention. It operates through mimetic desire (the consumer's wish to emulate the influencer) and brand attachment. Product-endorser fit moderates these indirect paths — attractiveness only triggers purchase-relevant motives when the endorser-product fit is perceived as appropriate.
55	Igarashi et al. (2024)	Authenticity, credibility, prosocial and purchase-related intentions	HIs generate stronger prosocial and purchase-related intentions than VIs when brand context is absent. This gap narrows in relatable or contextually appropriate settings. Perceived authenticity and credibility are primary determinants of purchase intention across influencer types.
56	Cao et al. (2025)	Engagement, perceived value, informativeness, novelty → purchase intention	Informativeness, entertainment, and incentives positively affect purchase intention indirectly via engagement and perceived value. Novelty has a negative direct effect on purchase. Engagement and perceived value fully mediate the path to purchase intention, confirming that VI novelty alone does not drive consumer buying behaviour.
57	Jha et al. (2025)	Trust as proximal driver of purchase intention (β=0.473)	Consumer trust is the proximal and most decisive driver of purchase intention (β=0.473). Source credibility has no significant direct effect on purchase once trust is in the model. This confirms trust as the final mediating link between influencer characteristics and consumer buying behaviour.

Appendix C: (Justification for using emerging and young adults as subjects)

We will use subjects aged 18 to 30 years because this age range broadly represents the transition from emerging adulthood to early young adulthood, a stage marked by identity exploration, self-presentation, and high engagement with digital and social media environments (Arnett, 2000). Moreover, previous research on influencer marketing shows that this age group is also particularly appropriate in the context of influencer marketing as they are very active on social media, and

highly responsive to influencer credibility and online source cues. For example, Djafarova and Rushworth (2017), in their study of Instagram-based influence, specifically examined users aged 18–30 and found that online personalities significantly shaped purchase-related responses.

Appendix D: Scales for measurement of variables

Source Credibility (Multi-dimensional: Expertise, Trustworthiness, Attractiveness) | **Scale: 15-item semantic differential (Ohanian, 1990)**		
Item #	**Scale Item (wording as used)**	**Source**
1	[EXPERTISE] Not an Expert (1) — Expert (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
2	[EXPERTISE] Inexperienced (1) — Experienced (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
3	[EXPERTISE] Unknowledgeable (1) — Knowledgeable (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
4	[EXPERTISE] Unqualified (1) — Qualified (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
5	[EXPERTISE] Unskilled (1) — Skilled (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
6	[TRUSTWORTHINESS] Undependable (1) — Dependable (7).	Ohanian (1990); Franke et al. (2023);

7	[TRUSTWORTHINESS] Dishonest (1) — Honest (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
8	[TRUSTWORTHINESS] Unreliable (1) — Reliable (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
9	[TRUSTWORTHINESS] Insincere (1) — Sincere (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
10	[TRUSTWORTHINESS] Untrustworthy (1) — Trustworthy (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
11	[ATTRACTIVENESS] Unattractive (1) — Attractive (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
12	[ATTRACTIVENESS] Not Classy (1) — Classy (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
13	[ATTRACTIVENESS] Ugly (1) — Beautiful (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
14	[ATTRACTIVENESS] Plain (1) — Elegant (7).	Ohanian (1990); Franke et al. (2023); Belanche et al. (2024)
15	[ATTRACTIVENESS] Not Sexy (1) — Sexy (7).	Ohanian (1990); Franke et al. (2023);

		Belanche et al. (2024)

Anchor: 1–7 bipolar adjective pairs | Note: The gold-standard source credibility measure; frequently abbreviated to trustworthiness and expertise sub-scales.

Parasocial Interaction (PSI) | Scale: 6-item, 7-pt Likert		
Item #	**Scale Item (wording as used)**	**Source**
1	I feel like I know this influencer personally.	Rubin et al. (1985); Colliander & Dahlen (2011); Lim & Lee (2023); Zhou et al. (2024)
2	When I follow this influencer, I feel like I am part of their group.	Rubin et al. (1985); Colliander & Dahlen (2011); Lim & Lee (2023); Zhou et al. (2024)
3	I feel this influencer understands me.	Rubin et al. (1985); Colliander & Dahlen (2011); Lim & Lee (2023); Zhou et al. (2024)
4	This influencer makes me feel comfortable, as if I am with a friend.	Rubin et al. (1985); Colliander & Dahlen (2011); Lim & Lee

		(2023); Zhou et al. (2024)
5	I would like to meet this influencer in person.	Rubin et al. (1985); Colliander & Dahlen (2011); Lim & Lee (2023); Zhou et al. (2024)
6	I miss this influencer when I have not followed their content for a while.	Rubin et al. (1985); Colliander & Dahlen (2011); Lim & Lee (2023); Zhou et al. (2024)

Anchor: 1 = Strongly Disagree — 7 = Strongly Agree | Note: Adapted from the classic PSI scale; often shortened to 3-4 items in influencer studies.

Consumer Engagement with Influencer Content | Scale: 5-item, 7-pt Likert

Item #	Scale Item (wording as used)	Source
1	I actively engage with this influencer's content (e.g., like, comment, share).	Barari et al. (2025); Hollebeek et al. (2014)
2	I often think about what this influencer posts.	Barari et al. (2025); Hollebeek et al. (2014)
3	I feel absorbed when viewing this influencer's content.	Barari et al. (2025); Hollebeek et al.

		(2014)
4	Following this influencer is something I enjoy doing.	Barari et al. (2025); Hollebeek et al. (2014)
5	I am enthusiastic about this influencer's posts.	Barari et al. (2025); Hollebeek et al. (2014)

Anchor: 1 = Strongly Disagree — 7 = Strongly Agree | Note: Adapted from the Consumer Brand Engagement scale (Hollebeek et al., 2014); cognitive, affective, and behavioural sub-dimensions.

Purchase Intention | Scale: 4-item, 7-pt Likert

Item #	Scale Item (wording as used)	Source
1	I would buy the product if the virtual influencer I follow endorses/posts about it.	Farivar & Wang (2022); Dabiran et al. (2024); Cao et al. (2025)
2	I would have the intention to buy the product that the virtual influencer I follow endorses or posts about.	Farivar & Wang (2022); Dabiran et al. (2024); Cao et al. (2025)
3	I would be interested in buying the product that the virtual influencer I follow endorses or posts about.	Farivar & Wang (2022); Dabiran et al. (2024); Cao et al. (2026)

4	It is likely that I would buy the product that the virtual influencer I follow endorses or posts about.	Farivar & Wang (2022); Dabiran et al. (2024); Cao et al. (2025)

Anchor: 1 = Strongly Disagree — 7 = Strongly Agree | Note: Adapted across virtual and human influencer contexts. Widely used in JRCS literature.

Machine Heuristic — Original Scale (Positive MH) | Scale: 5-item, 7-pt Likert

Item #	Scale Item (wording as used)	Sub-dimension	Source
1	When machines perform a task, the results are more objective than when humans perform the same task.	Objectivity	Sundar & Kim (2019); Park et al. (2024)
2	I trust machines more than humans to handle information accurately.	Trust / Accuracy	Sundar & Kim (2019); Park et al. (2024)
3	Machines are less biased than humans when completing tasks.	Unbiasedness	Sundar & Kim (2019); Park et al. (2024)
4	Machines are more secure than humans when dealing with private information.	Security / Privacy	Sundar & Kim (2019); Park et al. (2024)
5	Machines are more reliable than humans at executing tasks consistently.	Reliability	Sundar & Kim (2019); Park et al. (2024)

Anchor: 1 = Strongly Disagree — 7 = Strongly Agree | Note: Original unidimensional machine heuristic scale; Item 1 (objectivity) sometimes dropped due to low factor loading in VI studies. Used as a moderator in virtual influencer endorsement research. Adapted for virtual influencer context from Sundar & Kim (2019).

Machine Heuristic — Multidimensional Scale (Positive & Negative MH) | Scale: 7-item, 7-pt Likert			
Item #	**Scale Item (wording as used)**	**Facet (MH Direction)**	**Source**
1	Machines are experts at what they do.	Expert (Positive MH)	Yang & Sundar (2024); Molina & Sundar (2024)
2	Machines perform tasks more efficiently than humans.	Efficient (Positive MH)	Yang & Sundar (2024); Molina & Sundar (2024)
3	Machines treat all people the same, without bias or favouritism.	Fair (Positive MH)	Yang & Sundar (2024); Molina & Sundar (2024)
4	Machines are complex and difficult to understand.	Complex (Negative MH)	Yang & Sundar (2024); Molina & Sundar (2024)
5	Machines follow fixed rules and cannot adapt to unique situations.	Rigid (Negative MH)	Yang & Sundar (2024); Molina & Sundar (2024)
6	Machines are unnecessary when human judgement and creativity are required.	Superfluous (Negative MH)	Yang & Sundar (2024); Molina & Sundar (2024)
7	Machines cannot make the subtle, contextual judgements that humans can.	Rigid / Nuance-lacking (Neg. MH)	Yang & Sundar (2024); Molina & Sundar (2024)
Anchor: 1 = Strongly Disagree — 7 = Strongly Agree | Note: Validated multidimensional scale (Yang & Sundar, 2024). Items 1–3 (Expert, Efficient, Fair) tap Positive MH; Items 4–7 (Complex, Rigid, Superfluous, Nuance-lacking) tap Negative MH. Positive and Negative MH subscales can be scored and analysed separately as moderators of virtual influencer effectiveness. Negative MH items are reverse-scored when computing an overall MH composite. Used in studies of virtual influencer disclosure and uncanny valley responses.			

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